MTHRTL

OTSMULCG

LIS

OTS$MULCG
1-001

M 7
- G COMPLEX*16 Multiplication Routine   16-SEP-1984 01:54:30   VAX/VMS Macro V04-00   Page   1
                                          6-SEP-1984 11:27:42   [MTHRTL.SRC]OTSMULCG.MAR;1   (1)

```
0000      1              .TITLE   OTS$MULCG - G COMPLEX*16 Multiplication Routine
0000      2              .IDENT   /1-001/                   ; File: OTSMULCG.MAR
0000      3
0000      4    ;
0000      5    ;****************************************************************************
0000      6    ;*                                                                          *
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0000     24    ;*                                                                          *
0000     25    ;*                                                                          *
0000     26    ;****************************************************************************
0000     27    ;
0000     28    ;
0000     29    ;++
0000     30    ; FACILITY: Language-independent support library
0000     31    ;
0000     32    ; ABSTRACT:
0000     33    ;
0000     34    ;      A routine to provide compiled code support for G COMPLEX*16
0000     35    ;      multiplication.
0000     36    ;
0000     37    ; ENVIRONMENT: User Mode, AST Reentrant
0000     38    ;
0000     39    ;--
0000     40    ; AUTHOR: Steven B. Lionel, CREATION DATE: 13-July-1979
0000     41    ;
```

OTS$MULCG
1-001

N 7
- G COMPLEX*16 Multiplication Routine   16-SEP-1984 01:54:30 VAX/VMS Macro V04-00   Page 2
Edit History   6-SEP-1984 11:27:42 [MTHRTL.SRC]OTSMULCG.MAR;1   (2)

```
0000    43        .SBTTL  Edit History
0000    44 ; 1-001 - Original.  SBL 13-July-1979
```

```
              0000        46              .SBTTL  DECLARATIONS
              0000        47 ;
              0000        48 ; INCLUDE FILES:
              0000        49 ;
              0000        50
              0000        51
              0000        52 ; EXTERNAL DECLARATIONS:
              0000        53 ;
              0000        54              .DSABL  GBL                                 ; Prevent undeclared
              0000        55                                                         ; symbols from being
              0000        56                                                         ; automatically global.
              0000        57
              0000        58 ;
              0000        59 ; MACROS:
              0000        60 ;
              0000        61
              0000        62
              0000        63 ; EQUATED SYMBOLS:
              0000        64 ;
              0000        65
              0000        66
              0000        67 ; OWN STORAGE:
              0000        68 ;
              0000        69
              0000        70 ;
              0000        71 ; PSECT DECLARATIONS:
              0000        72 ;
          00000000        73              .PSECT _OTS$CODE PIC, USR, CON, REL, LCL, SHR, -
              0000        74                      EXE, RD, NOWRT, LONG
              0000        75
```

```
                                    C 8
                - G COMPLEX*16 Multiplication Routine    16-SEP-1984 01:54:30   VAX/VMS Macro V04-00    Page  4
                OTS$MULCG_R3 - G COMPLEX*16 Multiplicati  6-SEP-1984 11:27:42   [MTHRTL.SRC]OTSMULCG.MAR;1        (4)
```

```
                    0000     77            .SBTTL  OTS$MULCG_R3 - G COMPLEX*16 Multiplication
                    0000     78  ;++
                    0000     79  ; FUNCTIONAL DESCRIPTION:
                    0000     80  ;
                    0000     81  ;       This routine calculates the G COMPLEX*16 product of
                    0000     82  ;       two G COMPLEX*16 values.
                    0000     83  ;
                    0000     84  ; CALLING SEQUENCE:
                    0000     85  ;
                    0000     86  ;       product.wgc.v = OTS$MULCG_R3 (multiplier.rgc.v, multiplicand.rgc.v)
                    0000     87  ;
                    0000     88  ; INPUT PARAMETERS:
                    0000     89  ;
                    0000     90  ;       multiplier              - G COMPLEX*16 passed by VALUE!
                    0000     91  ;                                 Comprised of:
        00000004    0000     92  ;       a = 4                   ; Offset of real part of multiplier
        0000000C    0000     93  ;       b = 12                  ; Offset of imaginary part of multiplier
                    0000     94  ;       multiplicand            - G COMPLEX*16 passed by VALUE!
                    0000     95  ;                                 Comprised of:
        00000014    0000     96  ;       c = 20                  ; Offset of real part of multiplicand
        0000001C    0000     97  ;       d = 28                  ; Offset of imaginary part of multiplicand
                    0000     98  ;
                    0000     99  ; IMPLICIT INPUTS:
                    0000    100  ;
                    0000    101  ;       NONE
                    0000    102  ;
                    0000    103  ; OUTPUT PARAMETERS:
                    0000    104  ;
                    0000    105  ;       NONE
                    0000    106  ;
                    0000    107  ; IMPLICIT OUTPUTS:
                    0000    108  ;
                    0000    109  ;       NONE
                    0000    110  ;
                    0000    111  ; FUNCTION VALUE:
                    0000    112  ;
                    0000    113  ;       The G COMPLEX*16 product is returned in registers R0 through R3!
                    0000    114  ;       This is a violation of the VAX calling standard, but is allowed
                    0000    115  ;       because this is a compiled code support routine.
                    0000    116  ;
                    0000    117  ; SIDE EFFECTS:
                    0000    118  ;
                    0000    119  ;       Modifies registers R0-R3!
                    0000    120  ;       Possible error signals are:
                    0000    121  ;       SS$_ROPRAND     - Reserved operand
                    0000    122  ;       MTH$_FLOOVEMAT  - Floating overflow
                    0000    123  ;--
                    0000    124  ;--
                    0000    125
            0030    0000    126            .ENTRY  OTS$MULCG_R3, ^M<R4, R5>
                    0002    127            MTH$FLAG_JACKET                         ; Establish math error handler
                    0002
  6D  00000000'GF  9E  0002              MOVAB   G^MTH$$JACKET_HND, (FP)
                    0009                                                          ; set handler address to jacket
                    0009                                                          ; handler
                    0009
                    0009    128  ;+
```

OTS$MULCG
1-001

D 8
- G COMPLEX*16 Multiplication Routine   16-SEP-1984 01:54:30 VAX/VMS Macro V04-00   Page   5
OTS$MULCG_R3 - G COMPLEX*16 Multiplicati   6-SEP-1984 11:27:42 [MTHRTL.SRC]OTSMULCG.MAR;1   (4)

```
                           0009    129 ;            Complex multiplication is defined as:
                           0009    130 ;
                           0009    131 ;            real part = ac-bd
                           0009    132 ;            imaginary part = ad+bc
                           0009    133 ;-
  50   14 AC   04 AC 45FD  0009    134            MULG3   a(AP), c(AP), R0          ; R0-R1 = ac
  54   1C AC   0C AC 45FD  0010    135            MULG3   b(AP), d(AP), R4          ; R4-R5 = bd
             50   54 42FD  0017    136            SUBG2   R4, R0                    ; R0-R1 = ac-bd
  52   1C AC   04 AC 45FD  001B    137            MULG3   a(AP), d(AP), R2          ; R2-R3 = ad
  54   14 AC   0C AC 45FD  0022    138            MULG3   b(AP), c(AP), R4          ; R4-R5 = bc
             52   54 40FD  0029    139            ADDG2   R4, R2                    ; R2-R3 = ad+bc
                      04   002D    140            RET                              ; Return with product in R0-R3
                           002E    141
                           002E    142            .END
```

```
A                   = 00000004
B                   = 0000000C
C                   = 00000014
D                   = 0000001C
MTH$$JACKET_HND   ********  X   01
OTS$MULCG_R3        00000000 RG  01
```

```
                            +------------------+
                            ! Psect synopsis !
                            +------------------+


PSECT name                  Allocation        PSECT No.  Attributes
----------                  ----------        ---------  ----------
.  ABS  .                   00000000 (    0.)  00 (  0.)  NOPIC  USR   CON   ABS   LCL NOSHR NOEXE NORD  NOWRT NOVEC BYTE
_OTS$CODE                   0000002E (   46.)  01 (  1.)    PIC  USR   CON   REL   LCL   SHR   EXE   RD  NOWRT NOVEC LONG


                      +-------------------------+
                      ! Performance indicators !
                      +-------------------------+


Phase                   Page faults    CPU Time      Elapsed Time
-----                   -----------    --------      ------------
Initialization                  29    00:00:00.09    00:00:01.03
Command processing             106    00:00:00.83    00:00:07.31
Pass 1                          77    00:00:00.60    00:00:04.60
Symbol table sort                0    00:00:00.00    00:00:00.01
Pass 2                          41    00:00:00.46    00:00:02.79
Symbol table output              2    00:00:00.01    00:00:00.01
Psect synopsis output            2    00:00:00.02    00:00:00.02
Cross-reference output           0    00:00:00.00    00:00:00.00
Assembler run totals           259    00:00:02.02    00:00:15.77
```

The working set limit was 750 pages.
2250 bytes (5 pages) of virtual memory were used to buffer the intermediate code.
There were 10 pages of symbol table space allocated to hold 6 non-local and 0 local symbols.
202 source lines were read in Pass 1, producing 11 object records in Pass 2.
1 page of virtual memory was used to define 1 macro.

```
                      +--------------------------+
                      ! Macro library statistics !
                      +--------------------------+


Macro library name                          Macros defined
------------------                          --------------
_$255$DUA28:[SYSLIB]STARLET.MLB;2                 0
```

0 GETS were required to define 0 macros.

There were no errors, warnings or information messages.

MACRO/ENABLE=SUPPRESSION/DISABLE=(GLOBAL,TRACEBACK)/LIS=LIS$:OTSMULCG/OBJ=OBJ$:OTSMULCG MSRC$:MTHJACKET/UPDATE=(ENH$:MTHJACKET)+MSRC

OTSMULCD
LIS

OTSPOWCGC
LIS

OTSDIVC
LIS

OTSPOWDD
LIS

OTSPOWCC
LIS

OTSPOWGG
LIS

OTSPOWGJ
LIS

OTSPOWCDJ
LIS

MTHTAN
LIS

MTHVECTOR
LIS

OTSDIVCG
LIS

OTSPOWCJ
LIS

OTSPOWDLU
LIS

MTHTANH
LIS

OTSMULCG
LIS

OTSPOWCGJ
LIS

OTSPOWDJ
LIS

OTSDIVCD
LIS

OTSPOWCDC
LIS